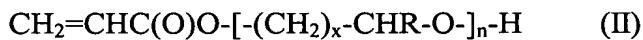


Application No.: 10/042,232
Amendment Dated: August 7, 2003
Reply to Office Action of: May 7, 2003

REMARKS

Applicants respectfully request reconsideration of the application, as amended, in view of the following remarks.

The present invention as set forth in **amended Claim 1** relates to a method for preparing an asymmetric (meth)acrylate crosslinking agent comprising **reacting an hydroxyacrylate of formula (II)**



with methacrylic anhydride to form an asymmetric (meth)acrylate crosslinking agent of formula (I) and methacrylic acid



wherein,

$x = 1, 2, \text{ or } 3,$

$R = H \text{ or } CH_3,$ and

$n = 1-100;$

wherein a reaction product containing the asymmetric (meth)acrylate crosslinking agent comprises less than 2 wt.% of a diacrylate, dimethacrylate, or mixture thereof.

As described in the specification under Discussion of the Related Art at pages 1 and 2:

“In addition, acryloyl chloride and methacryloyl chloride are also used for the synthesis of (meth)acrylate esters. In the case of acrylate esters in particular, however, care must be taken for effective binding of liberated HCl, to prevent the formation of byproducts containing chlorine.

...The synthesis of methacrylate esters starting from methacrylic anhydride and various alkanols with an additional ester function (lactate esters) is distinctly less successful. Despite catalysis with sulfuric acid, an excess of methacrylic anhydride and 5 hours of

Application No.: 10/042,232
Amendment Dated: August 7, 2003
Reply to Office Action of: May 7, 2003

heating at 130 °C, conversion of only about 50 % is achieved. In addition, the **separation of unreacted methacrylic anhydride presents problems** (C. E. Rehberg et al., *Journal of the American Chemical Society*, Vol. 67, 210 (1945))."

In contrast, to the known processes, the present invention provides an asymmetric cross-linking agent that has a high purity.

None of JP64-87608 , Organic Chemistry, Mazur et al (US 5,149,642), Emmons (US 5,243,069), Matheisen et al (US 5,219,479), Thanawalla et al (US 4,618,703), Powanda et al (US 4,859,792) disclose or suggest a method as claimed.

JP64-87608 discloses on pages 9 and 10 of the translation, generally without specifying the reaction conditions, the esterification of carboxylic acids with alcohols in the presence of strongly acidic catalysts such as sulfuric acid. Further described is the esterification of carboxylic acid chlorides with alcohols using a base for removal of hydrogen chloride. Also described is the transesterification of carboxylic acid anhydrides with alcohols.

However, there is no disclosure or suggestion to use methacrylic anhydride to form an asymmetric (meth)acrylate crosslinking agent or that the resulting product comprises less than 2 wt.% of a diacrylate, dimethacrylate, or mixture thereof, as claimed.

Further, the Examples at page 18 of the translation only describe the reaction with the very toxic methacrylic acid chloride. Example 4 describes the p-toluene sulfonic acid catalyzed esterification of methacrylic acid. The methods, however, are not useful to obtain product having the claimed purity.

Application No.: 10/042,232
Amendment Dated: August 7, 2003
Reply to Office Action of: May 7, 2003

An additional advantage of the claimed method is the by-product methacrylic acid. Since this compound is also polymerizable, it does not have to be removed from the reaction product. In addition, there is no need for bases to capture halogen chloride. In fact, the bases used in the Examples of JP64-87608, such as pyridine, are quite toxic. Thus, the use of toxic reaction materials can be avoided with the process according to the present invention. This is not disclosed or suggested by this reference.

Organic Chemistry merely discloses the esterification with acid anhydrides in general. But there is no disclosure or suggestion of the compound of formula (I) or any compound containing an unsaturated polymerizable group.

The Examiner has cited Mazur et al (US 5,149,642), Emmons (US 5,243,069), Matheisen et al (US 5,219,479), Thanawalla et al (US 4,618,703), Powanda et al (US 4,859,792) to show equivalency between acid chloride and acid anhydride. She further argues that no express motivation is required. However, there is no reasonable expectation of success when using acid anhydrides in combination with polymerizable alcohols. As discussed in the specification and cited above, it is known that synthesis of methacrylate esters starting from methacrylic anhydride is distinctly less successful. Thus, there is no motivation to use methacrylic anhydride to form an asymmetric (meth)acrylate crosslinking agent. Thus, even a combination of JP64-87608, Organic Chemistry, Mazur et al (US 5,149,642), Emmons (US 5,243,069), Matheisen et al (US 5,219,479), Thanawalla et al (US 4,618,703), Powanda et al (US 4,859,792) does not result in the present invention.

Application No.: 10/042,232
Amendment Dated: August 7, 2003
Reply to Office Action of: May 7, 2003

Therefore, the rejection of Claims 1-13 and 18 under 35 U.S.C. §103(a) as being unpatentable over JP64-87608 in view of “Organic Chemistry” by John McMurry, or separately in view of any one of the following Mazur et al (US 5,149,642) or Emmons (US 5,243,069) or Matheisen et al (US 5,219,479) or Thanawalla et al (US 4,618,703) or Powanda et al (US 4,859,792) is believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of this rejection is respectfully requested.

In addition, the rejection of Claims 1, 2, 5-10, 12, and 13 under 35 U.S.C. §103(a) as being unpatentable over SU 630249 in view of “Organic Chemistry” by John McMurry or separately in view of any one of the following Mazur et al (US 5,149,642) or Emmons (US 5,243,069) or Matheisen et al (US 5,219,479) or Thanawalla et al (US 4,618,703) or Powanda et al (US 4,859,792) is respectfully traversed.

None of the cited references disclose or suggest a method as claimed.

SU 630249 also uses acid chlorides instead of the claimed methacrylic anhydride. The secondary references have been discussed above and do not cure the defects of the primary reference. There is no reasonable expectation of success when using acid anhydrides in combination with polymerizable alcohols. As discussed in the specification and cited above, it is known that synthesis of methacrylate esters starting from methacrylic anhydride is distinctly less successful. Thus, there is no motivation to use methacrylic anhydride to form an asymmetric (meth)acrylate crosslinking agent. Thus, even a combination of SU 630249, Organic Chemistry, Mazur et al (US 5,149,642), Emmons (US 5,243,069), Matheisen et al

Application No.: 10/042,232
Amendment Dated: August 7, 2003
Reply to Office Action of: May 7, 2003

(US 5,219,479), Thanawalla et al (US 4,618,703), Powanda et al (US 4,859,792) does not result in the present invention.

Therefore, the rejection of Claims 1, 2, 5-10, 12, and 13 under 35 U.S.C. §103(a) as being unpatentable over SU 630249 in view of “Organic Chemistry” by John McMurry or separately in view of any one of the following Mazur et al (US 5,149,642) or Emmons (US 5,243,069) or Matheisen et al (US 5,219,479) or Thanawalla et al (US 4,618,703) or Powanda et al (US 4,859,792) is believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of this rejection is respectfully requested.

The rejection of Claim 9 under 35 U.S.C. § 112, 2nd paragraph, is respectfully traversed. Applicants believe that the claim language of Claim 9 is definite as it is well known what a polytetrahydrofuran chain is. Thus, Applicants request withdrawal of this rejection.

The objection to the specification is obviated by the amendment of the specification.

Applicants submit that the present application is now in condition for allowance and early notice of such action is earnestly solicited.

Respectfully submitted,

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